

Iron Deficiency Anemia in Pediatric Patients with Breath Holding Spells

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ABSTRACT

Background: Breath-holding spells can occur in infancy and early childhood, more common among 6 - 18 months of age. Roughly 5% of children have breath holding spells and iron deficiency anemia has been reported to be associated with it. **Study Design:** Cross sectional study. **Objective:** To determine the frequency of iron deficiency anemia in Pediatric patients having breath holding spells. **Place and duration of study:** Pediatric Department, Allied Hospital Faisalabad (December 2016 to May 2017). **Patient & Methods:** 95 cases of age 6 to 60 months attending the pediatric outdoor with breath holding spells were taken up in the study and written consent was taken from parents. Exclusion criteria were strictly followed. Patients included in the study were thoroughly evaluated by taking detailed history and examination. About 3cc blood was drawn for blood count (CBC) and serum ferritin level, sent to the hospital laboratory. Iron deficiency anemia was assessed as per my operational definition. **Results:** In this study, 61% (n=58) were between 6-36 months of age whereas 39%(n=37) were between 37-60 months of age, mean±SD was calculated as 38.74±11.98 months; 59%(n=56) were male and 41%(n=39) were females. Frequency of iron deficiency anemia in children with breath holding spells was recorded as 51.6%(n=49). **Conclusion:** Iron deficiency anemia is higher in breath holding children and effective treatment of these children is also easily available in the form of cheap iron preparation.

Keywords: Infants, Children, Breath holding spells, Iron deficiency anemia, Serum ferritin

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INTRODUCTION

Breath holding spells are age specific expressions of frustration and anger.¹ These attacks are very frightening for the parents and care givers.² They are triggered by mild trauma or emotional upset.³ During the spell child cries excessively and at the end he becomes apneac for several seconds and either becomes blue or pale or both, even he can go into tonic or clonic movements.⁴ The cyanotic form of breath holding spells occurs as a result of respiratory inhibition after autonomic instability, or due to intrapulmonary shunting. Pallid spells occur as result of vagal over-stimulation after a stimulus causing bradycardia or sudden asystole.⁵ Although breath holding spells are usually self-limited and resolve with time, they may be an initial symptom of prolonged QT syndrome and paroxysmal cardiac rhythm abnormalities.⁶ One other rare complication is prolonged syncope or even status epilepticus.⁷

The pathophysiology of breath holding spells is multifactorial. Among various causes iron deficiency anemia is the most important one.³ It causes spells by decreasing oxygenation of brain.⁶ A delay in brain stem myelination measured through brain stem evoked potentials is also a contributing factor.⁸ Other risk factor include zinc deficiency, positive family history, birth sequence, parent's education status and father's age.⁹

According to World Health Organization, about 45% children in the world and 30% in Pakistan have iron deficiency. Deficiency of iron leading to iron deficiency anemia is one of the major

micronutrient deficiencies that occur in the developing countries.^{10,11} Iron supplementation should be considered in children with anemia even if signs of iron deficiency are not present.¹² Besides iron, refractory cases of breath holding spells have been treated successfully with piracetam, and cardiac pacemaker implantation.^{7,13}

Studies from all over the world showed that breath holding spells are frequently associated with iron deficiency anemia.^{1,3,14} One such study conducted in Rawalpindi showed association of breath holding spells with iron deficiency anemia as 56.67%¹⁵ and treatment with iron supplements greatly reduced its frequency.¹⁴

There is no study conducted so far in our local hospital, as per my knowledge, so rationale of my study is to find frequency of iron deficiency anemia in children with breath holding spells who present to our local hospital and treat these children with easily available and cheap iron supplements so that parents anxiety could be reduced and there will be decreased number of unnecessary investigations and less number of visits to the hospital.

METHODOLOGY

Study Design: Cross sectional study.

Settings: Pediatric Department, Allied Hospital Faisalabad

Duration: From December 2016 to May 2017.

Methods: 95 children of age 6 to 60 months attending the pediatric outdoor with breath holding spells fulfilling the inclusion criteria were included in the study through non-probability purposive sampling, with informed written consent from parents/guardians. Breath holding spells were clinically diagnosed and defined as child's breathe holding stopped in expiration after a deep inspiration during crying. Patients were thoroughly evaluated by taking detailed history and examination. About 3cc blood was drawn for complete blood count and serum ferritin level and sent to the hospital laboratory. Iron deficiency anemia was labeled if patients had total hemoglobin level in range of 5-10 g/dl and serum ferritin level < 12 microgram/liter. Sample size of 95 was calculated by taking confidence level of 95%, and absolute precision of 10% and taking expected percentage of iron deficiency anemia in children with breath holding spells as 56.6%. Patients having congenital heart disease diagnosed on echocardiography, febrile or non-febrile seizures, severe malnutrition and those on anticonvulsant therapy or having mental disability were excluded. Age, gender, height, weight, relevant history and physical exam, all the findings were documented. Outcome of the study included the presence or absence of iron deficiency anemia in patients with breath holding spells. Data was entered and analyzed through SPSS-20. Mean and standard deviation was calculated for all quantitative variables like age, hemoglobin level, and serum ferritin level. Frequency and percentage were calculated for all qualitative variables like gender and iron deficiency anemia. Effect modifier like age and gender was controlled by stratification. Post stratification chi square test was applied. P value <0.05 was taken as significant.

RESULTS

A total of 95 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of iron deficiency anemia in children with breath holding spells.

Age distribution of the patients was done, it shows that 61.05%(n=58) were between 6-36 months of age whereas 38.95%(n=37) were between 37-60 months of age, mean±SD was calculated as 38.74±11.98 months. (Table No. 1)

Table 1: Age distribution (n=95)

Age (in months)	No. of patients	%
6-36	58	61.05
37-60	37	38.95
Total	95	100
Mean±SD	38.74±11.98	

Gender distribution of the patients was done, it shows that 58.95%(n=56) were male and 41.05%(n=39) were females. (Table No. 2)

Table 2: Gender distribution (n=95)

Gender	No. of patients	%
Male	56	58.95
Female	39	41.05
Total	95	100

Mean Hb level was recorded as 9.74±4.21(g/dl). (Table No. 3)

Table 3: Mean Hb level of the patients (n=95)

Hb level(g/dl)	Mean	Sd
	9.74	4.21

Mean ferritin level was recorded as 10.47±5.87(mg/l). (Table No. 4)

Table 4: Mean serum ferritin level of the patients (n=95)

Serum ferritin levels(mg/l)	Mean	Sd
	10.47	5.87

Frequency of iron deficiency anemia in children with breath holding spells was recorded as 51.58%(n=49) whereas this morbidity was absent in 48.42%(n=46). (Table No. 5)

Table 5: Frequency of iron deficiency anemia in children with breath holding spells (n=95)

Iron deficiency anemia	No. of patients	%
Yes	49	51.58
No	46	48.42
Total	95	100

Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to age shows that out of 49 cases of iron deficiency anemia, 30 were between 6-36 months of age whereas 19 were between 37-60 months of age, p value was 1.06. (Table No. 6)

Table 6: Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to age

Age (in months)	Iron Deficiency Anemia		P value
	Yes	No	
6-36	30	28	1.06
37-60	19	18	

Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to gender shows that out of 49 cases of iron deficiency anemia, 25 were male whereas 24 were females, p value was 1.06. (Table No. 7)

Table 7: Stratification for frequency of iron deficiency anemia in children with breath holding spells with regards to gender

Gender	Iron Deficiency Anemia		P value
	Yes	No	
Male	25	31	0.10
Female	24	15	

DISCUSSION

Breath-holding spells occur mostly among children of six months to eighteen months and sometimes in later childhood. Almost 50 out of 1000 children have these spells making parents worried. Infants or children hold their breath while crying excessively to a point they might become unconscious. Studies show that iron deficiency lead to anemia and decreased oxygen exchange in the lungs and leading to hypoxia.¹⁻⁴

This study was conducted to find the frequency of iron deficiency anemia in children with breath holding spells that presented to our local hospital and treat these children with easily available and cheap iron supplements so that parent's anxiety may be reduced and there will be decreased number of unnecessary investigations and less no.of visits to the hospital.

In this study, out of 95 cases, 61.05%(n=58) were between 6-36 months of age whereas 38.95%(n=37) were between 37-60 months of age, mean+SD was calculated as 38.74+11.98 months, 58.95%(n=56) were male and 41.05%(n=39) were females. Iron deficiency anemia in breath holding patients was recorded as 51.58%(n=49) whereas this morbidity was absent in 48.42%(n=46).

Studies from all over the world showed that breath holding spells are frequently associated with iron deficiency anemia.^{1,3,14} One such study conducted in Rawalpindi showed association of breath holding spells with iron deficiency anemia as 56.67%.¹⁴ And treatment with iron supplements greatly reduced its frequency.¹⁴ The findings of our study correspond to the study conducted at Rawalpindi.

Handan Gençgönül and others¹⁶ evaluated serum iron and serum zinc in patients with breath-holding spells and recorded that anemia was observed in 56% patients.

Another recent study¹⁷ performed a clinical and laboratory analysis through reviewing the data of 64 child having breath holding spells considering the types of BHS and its relation to iron deficiency anemia, with special consideration to neurodevelopmental status and EEG finding and recorded that 62.5% of children with BHS has anemia, the frequency of BHS has improved markedly with 12 weeks of elemental iron therapy. Rahul Jan and others¹⁸ analyzed the effect of iron supplementation in children with breath holding spells, irrespective of their iron status and study the factors associated with the response and concluded that iron supplementation is effective in the management of breath holding spells. Non-anaemic and iron-replete children with breath holding spells also respond well to iron supplementation.

However, the findings of our study reveal that iron deficiency anemia is commonly found in children presenting with breath holding spells, and the treatment of these children with easily available and cheap iron supplements is effective which may reduce the anxiety of the parents consequently it will decrease the number of unnecessary investigations and less no of visits to the hospital.

CONCLUSION




Iron deficiency anemia is strongly associated with breath holding pediatric patients. However, the treatment of these children with easily available and cheap iron supplements is effective which may reduce the anxiety of the parents consequently it will also decrease the number of unnecessary investigations and less no of visits to the hospital.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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